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Application No. 10/824,719  
Technology Center 1795  
Amendment dated January 22, 2008  
Reply to Office Action dated November 21, 2007

**REMARKS**

As of the filing of the present Office Action, claims 1-24 were pending in the above-identified US Patent Application. In the Office Action, the Examiner withdrew all previous objections to the specification and drawings and all previous rejections of the claims, but then rejected all of the pending claims under 35 USC §102 or §103. In response, Applicants have amended the claims as set forth above. More particularly, independent claim 1 has been amended to incorporate the limitations of its dependent claim 3 (canceled without prejudice), and claim 2 has been amended to correct a typographical error.

Applicants believe that the above amendments do not present new matter. Applicants further believe that the amendments strictly comply with 37 CFR §1.116(a) as being limited to reducing and simplifying the issues remaining in the examination of Applicants' application or in some other way requiring only a cursory review by the Examiner, namely, the cancellation of a dependent claim and incorporation of its subject matter into its parent claim. Consequently, Applicants believe that the above amendments do not raise new issues that would require further consideration and/or search by the

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Examiner, and place the claims in better condition for appeal. MPEP §714.13.

Favorable reconsideration and allowance of remaining claims 1, 2, and 4-24 are respectfully requested in view of the above amendments and the following remarks.

### **Preamble**

Applicants respectfully disagree with the Examiner's position that the recitation in the preamble of Applicants' claim 1 is merely an "intended use," particularly in view of claim 1 as now amended.

Applicants believe the recitation in the preamble requiring Applicants' claimed "system" as being "for storing and retrieving elemental hydrogen" must be accorded patentable weight because elements recited in the claim body, namely, "a hydrogen storage member comprising a block of porous silicon having interior surfaces adapted to adsorb and store hydrogen," and "a control system for regulating storage of hydrogen into and retrieval of hydrogen from said hydrogen storage member" are pointless if in fact the "system" is not "for storing and retrieving elemental hydrogen." Applicants note that, when considering what effect is to be given a claim's preamble language,

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The preamble is not given the effect of a limitation unless it breathes life and meaning into the claim. . . . In claims directed to articles and apparatus, any phraseology in the preamble that limits the structure of that article or apparatus must be given weight. (Emphasis added).

MPEP §2111.02

Furthermore,

"[C]lear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention....

MPEP 2111.02.II., citing *Catalina Mktg. Int'l v. Coolsavings.com, Inc.*, 289 F.3d 801, 808, 62 USPQ2d 1781, 1785 (Fed. Cir. 2002).

Applicants' arguments set forth below clearly rely on the preamble of the independent claim 1 (as well as the preamble of independent claim 8) "to distinguish the claimed invention from the prior art." Therefore the preamble of independent claim 1 "breathes life and meaning into the claim," such that (paraphrasing *In re Stencel*, 4 USPQ2d 1071 (Fed. Cir. 1987), cited at MPEP 2111.02.II.)

the framework - the teachings of the prior art - against which patentability is measured is not all [systems] broadly, but [systems] suitable for [storing and retrieving elemental hydrogen], for the claims are so limited.

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**Rejections based on U.S. Pat. No. 5,882,496 to Northrup et al. (Northrup)**

Independent claim 1 and its dependent claims 2-7 and 15-22 were rejected as anticipated by Northrup or unpatentable over Northrup alone or in further view of U.S. Patent No. 4,265,720 to Winstel, U.S. Patent No. 5,196,377 to Wagner et al. (Wagner), or U.S. Patent No. 5,360,461 to Meinzer. Applicants respectfully request reconsideration of these rejections in view of the amendments presented above as well as the following comments.

Dependent claim 3 was solely rejected under 35 USC §103 in view of the combination of Northrup and Winstel. Because claim 1 has been amended to incorporate all of the limitations of claim 3, Applicants believe that the rejections based on Northrup alone and Northrup combined with Wagner and Meinzer are overcome. Applicants believe the combination of Northrup and Winstel do not teach or suggest amended independent claim 1.

Northrup consistently and repeatedly cites that gases are adsorbed/desorbed from coatings on the porous silicon. For example, see Northrup at line 50 of column 1, line 43 of column 2, line 16 of column 4, and line 40 of column 5. Northrup does not disclose or even imply that the adsorbed/desorbed gases are in direct contact with silicon. It is well known

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that high surface areas facilitate gas adsorption, such as with activated charcoal, and it is for this reason that Northrup uses porous silicon. Northrup then uses porous silicon merely as a framework upon which adsorbent coatings are applied. Northrup could just as easily have used any other porous material.

Winstel discloses an "operative valve control means 6 . . . for charging and discharging of hydrogen" from a container 4. Such a "valve control means" could be a simple spigot or manually-operated needle valve. In contrast, the "control system" originally recited in claim 3 and now recited in amended claim 1 is much more. According to the *Wiley Electrical and Electronics Engineering Dictionary* (Kaplan, 2004), a control system is defined as "A system utilized to maintain one or more output quantities within specified parameters." According to the *McGraw-Hill Dictionary of Scientific and Technical Terms* (6th ed. 2003), a control system is defined as "A system in which one or more outputs are forced to change in a desired manner as time progresses." The text and figures of Winstel disclose a simple valve, with no sensors, no feedback, no controller, and no actuators. Therefore, Winstel merely discloses a valve for closing the container 4, and does not disclose a "control system for regulating storage of hydrogen into and retrieval of

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hydrogen from said hydrogen storage member.”

Finally, though dependent claim 24 was deemed to be a product-by-process claim in which “the product . . . is the same as or obvious over the product of [Northrup],” such a conclusion overlooks the fact that Applicants teach the “silicon waste obtained from a silicon process waste stream” recited in claim 24 generally does not contain crystallinity. [0071]. In contrast, Northrup discloses the use of crystalline silicon, and Northrup does not disclose or suggest that waste silicon could be useable in Northrup’s process. As such, Northrup cannot be the sole basis for rejecting claim 24.

In view of the above, Applicants respectfully believe that the combination of Northrup and Winstel does not teach or suggest the system recited in Applicants’ claim 1 nor any of the claims depending from claim 1, and therefore respectfully request withdrawal of the rejections under 35 USC §§102 and 103 based on Northrup.

**Rejections based on U.S. Pub. No. 2004/0209144 to Kornilovich**

Independent claim 8 and its dependent claims 9-14 were rejected as anticipated by Kornilovich or unpatentable over Kornilovich alone or in further view of U.S. Published Patent Application No. 2002/0172820 to Majumdar et

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al. (Majumdar) or U.S. Patent No. 6,040,230 to Anthony et al. (Anthony).

Applicants respectfully request reconsideration of these rejections in view of the following comments.

Kornilovich consistently and repeatedly cites three important features which are significant and contrary to Applicants' invention recited in claim 8. First, Kornilovich teaches that the storage medium is for neutral/molecular hydrogen ( $H_2$  molecules), and not elemental (monatomic) hydrogen as taught and claimed by Applicants. Second, the neutral/molecular hydrogen is stored on functionalized organic molecules on the exterior of the silicon nanowire (column), and not directly in the silicon column itself as required by Applicants' invention recited in claim 8. Third, Kornilovich teaches that the neutral/molecular hydrogen is absorbed by physisorption, and not chemisorption as taught by Applicants. Emphasis on "neutral hydrogen," "functionalized," "organic molecules," and "physisorption" can be found throughout Kornilovich. Because silicon does not physisorb neutral hydrogen, Kornilovich's use of silicon is unnecessary, as acknowledged at [0009] ("the nanowire core may be a silicon nanowire"; emphasis added). Accordingly, Kornilovich could just as easily have used any other nanowire material.

Finally, though dependent claims 10 and 11 were deemed to be

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product-by-process claims in which “the product . . . is the same as or obvious over the product of [Kornilovich]”, such a conclusion overlooks the fact that the process dictates physical limitations for the product, namely, “said silicon columns . . . have surfaces on the (111) plane” (claim 10) and “said silicon columns have a minimum energy configuration suitable for forming a crystal” (claim 11). Applicants do not find any teachings in Kornilovich regarding these limitations, and as such Kornilovich cannot be the sole basis for rejecting claims 10 and 11.

In view of the above, Applicants respectfully believe that Kornilovich or any combination of Kornilovich with Majumdar or Anthony cannot teach or suggest the system recited in Applicants’ claim 8 or its dependent claims 9-14. Applicants therefore respectfully request withdrawal of the rejections under 35 USC §§102 and 103 based on Kornilovich.

### Closing

In view of the above, Applicants believe that all issues outstanding from the Office Action have been addressed, and that the claims define patentable novelty over all the references, alone or in combination, of record. It is therefore respectfully requested that this patent application be given

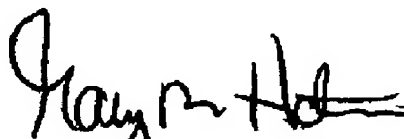


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favorable reconsideration.

Should the Examiner have any questions with respect to any matter  
now of record, Applicants' representative may be reached at (219) 462-4999.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Gary M. Hartman", with a stylized flourish at the end.

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January 22, 2008  
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